Editorial: Twenty Five Years and Counting
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The Ontario Thoracic Reviews are now 25 years old! The lead article in the first issue published in 1985 was a historical review of the Ontario Thoracic Society written by Dr. Cameron Gray. John Morse was the President of the OTS and with his support Stan Epstein undertook to initiate this publication. At first, there were two publications per year but subsequently that has been increased to three and now, by my count, this is the 69th issue. I became involved in 1989 when Stan invited me to become Associate Editor. I took over as Editor in 1993. In his editorial in 1985, Stan suggested that Ontario Thoracic Reviews filled a “gap” by providing current information on important topics in lung disease to practising physicians. In 1990, I wrote an editorial for the Ontario Thoracic Reviews congratulating Stan Epstein and celebrating the success of this publication over its first five years. I measured our success from informal feedback from colleagues and the increased demand for the circulation of the Ontario Thoracic Reviews which at that time had expanded to include the Ontario College of Family Physicians and the Canadian Thoracic Society. Over the ensuing years, we have conducted infrequent needs assessments from our readership and again have received positive feedback. We have tried as much as possible to incorporate topics and authors as requested. Was the gap that Stan wanted to address and the accolades that we received truly improving the care of our Respiratory patients?

I don’t know, but based on recent knowledge translation literature it seems unlikely.

Samir Gupta addresses this dilemma in this issue of the Ontario Thoracic Reviews. He points out that despite several iterations of the CTS Asthma Guidelines, Canadian patients are frequently not receiving guideline-based care. The same is unfortunately true for COPD. Knowledge Translation Scientists such as Dr. Gupta are trying to determine the most effective strategies to implement guidelines. How do we close the gap between scientific knowledge and patient care? How do we change physician behavior? Multiple strategies have been tried in various settings but to date the solution is elusive. Clearly this issue is a very complex and challenging problem. Different strategies are going to prove more effective with different physician groups and in different clinical settings. One size will not fit all.

Having said all this, I still think the Ontario Thoracic Reviews do fill a gap as Stan wrote 25 years ago. The two new editors, Chris Li and Mark Soth, have decided to make the publication paperless. In part this decision was driven by economic realities but it also makes sense as the younger generation of physicians are turning almost exclusively to their computers to update their knowledge.
For my part, I wish to thank our many authors, the hardworking staff at the OLA and our pharmaceutical sponsors. I have enjoyed my role as editor and have learned a great deal which I hope has been translated into better care for my patients. Happy Birthday Ontario Thoracic Reviews!

Knowledge Translation: Delivering the Benefits of Respiratory Research to Our Patients
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Introduction
Health sciences research is a global enterprise which is continually expanding in size, sophistication, and productivity, yielding an ever-growing body of new medical knowledge intended to improve health. However, evaluations of delivered care have consistently demonstrated gaps between existing medical knowledge and current practice. In fact, studies examining quality of care across disciplines and jurisdictions have estimated that 30% to 45% of patients are not offered evidence-based best care, and 20% to 30% receive contraindicated and potentially harmful care. These prevalent “care gaps” suggest that despite the considerable resources devoted to generating new knowledge, we have yet to deliver the full health benefits of existing research to our patients.

Knowledge Translation: What it Is
Knowledge translation (KT) is a methodological approach developed specifically to address these care gaps. Although quality assurance research has been highlighting our failure to consistently adopt research findings into practice over the last few decades, it is the more recent emphasis on evidence-based, cost-effective, and accountable health care that has spurred the science of KT. In recent years, KT has become an area of focus for funding agencies, policymakers, and educators, driving an exponential growth in KT research. In fact, a MEDLINE database search of this phrase yielded fewer than 100 articles in 1990, whereas today, it yields several thousand.

Unfortunately, the eclectic use of this phrase in different settings has led to its status as a buzz phrase, resulting in considerable confusion among both practitioners and researchers regarding its definition. In 2000, the Canadian Institutes of Health Research (CIHR) defined KT as “the exchange, synthesis and ethically-sound application of knowledge - within a complex system of interactions among researchers and users - to
accelerate the capture of the benefits of research...⁵. More simply, KT is the scientific study of the methods for closing the knowledge-to-practice gap, including the analysis of barriers and facilitators inherent in this process⁴.

**Knowledge Translation: What it Isn’t**

It is also important to distinguish KT from a number of other areas with which it has often been confused. For example, despite the tempting homophony, translational research is concerned with the transfer of basic science discoveries into clinical applications (so called “bench-to-bedside”), and is distinct from KT in that it does not address widespread adoption. Continuing medical education (CME) aims to increase health care professionals’ clinical competence, but falls short of KT’s target outcome of improved health status and its broad target audience including patients and policymakers. Continuing professional development (CPD) involves a more sophisticated longitudinal approach to maintaining competence, but again targets only the health care professional. Accordingly, KT both subsumes and builds upon CME and CPD³. Quality improvement (QI) efforts improve local health care practices in order to attain specific health outcomes. In contrast to KT activities, which are theory-driven and seek to be broadly applicable, most QI efforts are guided by trial and error with continual re-assessment, and driven by local needs, limiting their generalizability.

**Care Gaps in Respiratory Disease**

Respiratory diseases affect at least 20% of the Canadian population and their prevalence has increased in the last few decades⁶. Although important recent advances have improved our ability to detect, treat, and follow patients with common conditions such as asthma and chronic obstructive pulmonary disease (COPD), inappropriate and/or incomplete care remains common in these conditions. Employing a telephone survey of over thirteen thousand Americans across twelve major metropolitan areas, McGlynn and colleagues sought to quantify adherence to a wide range of pre-established care indicators based on national guidelines and the latest medical literature¹. Using 25 key quality indicators in asthma and 20 in COPD, they reported percentages of recommended care delivery in these diseases of only 53.5 (50.0-57.0), and 58.0 (51.7–64.4), respectively.

Several studies have documented similar care gaps in the Canadian setting. For example, over one third of patients with uncontrolled asthma were not prescribed first line inhaled corticosteroid (ICS) controller therapy⁷, despite multiple well-designed randomized-controlled trials and a corresponding level 1 recommendation in the latest Canadian Asthma Consensus Guidelines, supporting this practice⁸. Similarly, 49% of Canadian smokers visiting a health-care provider in the preceding 12 months did not receive advice to reduce or quit smoking⁹, and more than one third (37%) of patients with COPD had not received their annual influenza vaccination¹⁰. Again, these were level 1 and level 2 evidence-based recommendations, respectively, in the latest Canadian Thoracic Society COPD Guidelines¹¹. Furthermore, patients with COPD were
more likely to be prescribed an inhaled corticosteroid than a bronchodilator\textsuperscript{10}, contrary to strong evidence and clear guideline recommendations\textsuperscript{11}.

**Clinical Practice Guidelines in Respirology**

Clinical practice guidelines play an important bridging role in the continuum between research evidence and clinical practice. By appraising and summarizing latest evidence and presenting practice recommendations accordingly, they provide a key starting point for knowledge dissemination. The Canadian Thoracic Society (CTS) has produced and disseminated guidelines in respiratory health since the late 1980s, and has recently revised its guideline process and production cycle with a view to improving the quality of its guidelines\textsuperscript{12}. However, as exemplified in the above examples, the distillation and dissemination of information in the form of guidelines, even with clearly stated recommendations, is insufficient to ensure their implementation. It is for this reason that respiratory guideline development must be complimented by a dedicated KT process.

**The Knowledge-to-Action Cycle**

Because KT involves actively engineering changes in a complex social system comprised of various groups of individuals in order to affect behaviour (so called “planned-action”), theoretical frameworks for KT have borrowed from the disciplines of organizational innovation and social and behavioural psychology\textsuperscript{13}. In 2006, Graham and colleagues undertook a review of over 60 such planned-action theories, frameworks, and models, identifying common elements in order to develop a practical model for KT activities\textsuperscript{3}. This model, called the “Knowledge-to-Action” (KTA) Process has since been adopted by the CIHR as their conceptual framework for KT activities\textsuperscript{14}. It is worth considering the various components of the KTA process (Figure 1) while highlighting how each might apply to the respiratory health context.

For conceptual purposes, the KTA process has been divided into knowledge creation and action, with each comprising several phases or categories (Figure 1). Knowledge creation is represented by the inverted pyramid at the center of the cycle. As various types of new and existing knowledge progress through this “knowledge funnel,”\textsuperscript{3} information becomes increasingly valid and useful to stakeholders. Knowledge inquiry refers to a wide variety of primary studies of varying methodological rigor and external validity surrounding a particular question; knowledge synthesis refers to the systematic process by which these primary studies are then appraised, synthesized, and presented in the form of a systematic review. Finally, when sufficient scientific research exists to support a course of action, knowledge tools and products seek to present this in a clear, concise, and user friendly format, in order to facilitate uptake and application of this knowledge by target stakeholders. Examples would include various CTS Guidelines and periodic Guideline Updates, COPD pocket cards (“Slim Jims”) mailed to primary care physicians and other health care practitioners, and the recent case-based review of asthma presented in the Canadian Medical Association Journal\textsuperscript{15}.  

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Figure 1. The Knowledge-To-Action Process

The action part of the KTA process is illustrated as a cycle surrounding the knowledge funnel (Figure 1). These are the steps which are required to successfully implement the knowledge, and should be thought of as dynamic and bidirectional, with each influencing and often overlapping with others. One can enter the action cycle in one of two ways. Firstly, one might come across a clinical problem that deserves attention, and then turn to the knowledge funnel to identify, review and select the knowledge which addresses that problem, with a view to implementing it. For example, 45.4% of Canadians with COPD still smoke\textsuperscript{10}. A review of the knowledge funnel reveals randomized-controlled trials\textsuperscript{16}, a Cochrane review\textsuperscript{17}, and a CTS Guideline demonstrating that a brief physician smoking cessation intervention improves quit rates and reduces all cause mortality in COPD\textsuperscript{11}; this is the knowledge that requires implementation. Alternatively, one might start by becoming aware of the knowledge itself, often in the form of an evidence-based practice recommendation, and then seek to determine whether there is a knowledge-to-practice gap that requires action. For example, the Canadian Asthma Consensus Guidelines recommend that all patients with asthma receive a written asthma action plan (Level I evidence)\textsuperscript{8}, yet a nation-wide survey revealed that 89% of patients with asthma had never received one\textsuperscript{7}.

Upon entering the cycle, one must first adapt the knowledge of choice to the local context of interest. The value, usefulness, and appropriateness of the particular knowledge must be optimized with the particular target audience and scope of the KT intervention in mind. For example, knowledge of the importance of bronchodilators as opposed to inhaled corticosteroids as first-line therapy for COPD would need to be tailored very differently for a target audience of respirologists compared to primary care physicians, and still differently if one were targeting pharmacists.

Next, one should assess the existing barriers to knowledge use. Although awareness of, or familiarity with, the knowledge itself can sometimes be a barrier, practitioners may often be well informed but face a multitude of other barriers limiting knowledge application. Existing frameworks for barrier assessment and classification can be helpful in documenting barriers ranging from internal factors such as practitioner attitudes, to external factors such as patient or environmental factors, including a lack of time and/or resources\textsuperscript{18}. Although barriers can be assessed directly through qualitative research employing interviews and/or questionnaires with target stakeholders, they may also be extrapolated from existing studies in comparable populations. For example, Canadian studies suggest that the barriers to physician delivery of asthma action plans (AAPs) are multi-faceted, including a lack of time\textsuperscript{7,19}, a lack of experience and confidence in generating appropriate AAP recommendations, and a lack of availability of AAPs at the point of care\textsuperscript{7,19-21}.

Once one has identified the barriers, specific interventions can be selected and tailored accordingly. Appropriate interventions can be selected among a suite of previously
applied KT interventions addressing similar barriers. For example, barriers related to knowledge and attitudes might best be addressed with interactive educational interventions and outreach visits, whereas environmental and system-level barriers can be addressed through reminder systems, or changes to resources and/or the remuneration process\(^3\). In addition, any previously studied KT interventions addressing the particular care gap of interest, whether successful or not, should be studied for their applicability. For example, researchers in the United Kingdom attempted to improve asthma care by integrating tailored guideline recommendations into an existing electronic health record system. However, both the number of times that the guideline was triggered and physician interaction beyond the first information screen were low, and quality of care was unchanged\(^22\). In contrast, an intervention consisting of a paper-based prompt highlighting guideline-based care, completed by patients in the physician’s waiting room and then handed to their physicians, significantly increased the rate of AAP delivery and appropriate follow-up\(^23\).

Once the intervention is in place for a set period of time, outcomes should be ascertained. Knowledge use is the intermediate outcome required to ensure the ultimate health outcome of interest. The first stage of knowledge use is referred to as “conceptual knowledge use,” and includes changes in the level and understanding of the knowledge itself, as well as attitudes around its use. This can be measured through qualitative research methods including focus groups, interviews, and questionnaires in the target group. Examples would include practitioners’ knowledge of the importance of an AAP, possession of adequate skills to prepare one, and intention to provide one to their patients. The next stage, referred to as “instrumental knowledge use,” is the concrete application of this knowledge in the form of a behaviour or practice change. Examples include the actual frequency of AAP delivery to patients with asthma, or smoking cessation counseling to patients with COPD who smoke\(^24\). These can be measured through chart audits or patient accounts of the clinical interaction.

Finally, the actual health impact of the KT intervention can be measured. Generally, these outcomes are measured at a patient level, but can also be at the level of the provider (e.g. satisfaction), and/or the health care system (e.g. cost). Examples of relevant patient-level outcomes would include smoking cessation rates and mortality for a smoking cessation intervention, and emergency room visits and asthma-related quality of life for an asthma action plan intervention. It should be noted that although interventions are designed to achieve changes in knowledge use, it is their positive downstream impact on patient health that should ideally be used to measure their success.

Because all health systems are complex and continually evolving, a concerted effort must be made to sustain the achieved knowledge use. Knowledge implementers must be aware of new barriers and facilitators to behaviour change, and continually adjust interventions accordingly. Barriers to sustainability may also be distinct from barriers to
initial adoption and behaviour change. Sustainability strategies are developed in the same way as initial interventions were, by cycling back through the steps in the KTA cycle, as such initiating a feedback loop\textsuperscript{3}.

**Conclusion**
As demonstrated by the numerous care gaps across the spectrum of respiratory diseases, the conventional approach espoused by both producers and brokers of knowledge, whereby research findings are passively disseminated to potential users, fails to maximize the potential benefits of this research for our patients. Recognition of both these lost potential health gains and potential harms resulting from these knowledge-to-practice gaps has given rise to the science of knowledge translation. The knowledge-to-action cycle provides a structured approach to knowledge translation, which can be used as a model for would-be implementers, across disciplines and diseases. As leaders both in the generation of new knowledge in the field of respirology, and in the production of evidence-based respiratory guidelines across a wide spectrum of respiratory illness, Ontarians and Canadians are poised to now turn their attention to the implementation of this knowledge.

The Knowledge-To-Action Process
A detailed description of the KTA Cycle is available on the KT Clearinghouse website (http://ktclearinghouse.ca/knowledgebase/knowledgettoaction).

**References**


Collaborative Care Networks – Family Physicians and Respirologists
Sharing Expertise
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The Ontario College of Family Physicians (OCFP) is the Ontario Chapter of the College of Family Physicians of Canada. The College was founded in 1954 to provide general practitioners, as they were called in those days, with the level of support that their specialist colleagues were receiving from the Royal College of Physicians and Surgeons. One of the first things on the agenda in those early years was the establishment of standards for the practice of a new and emerging specialty - family medicine. With those standards in place, the sixteen, and now seventeen medical universities, began to establish accredited residency programs in family medicine under the auspices of the College.

During this same time frame, the ten provincial Chapters of the College established their unique roles by developing, providing and accrediting continuing professional development (CME/CPD) opportunities for general practitioners and the graduates of our residency programs. While our residents spend two to three years in our university programs, quality patient care requires family physicians to be life-long learners. Formal CME/CPD acquired through attendance at conferences, workshops or small group learning programs or through self-learning (web-based interactive programs or journal articles) provides family physicians with opportunities to stay current; however, family physicians also acquire new knowledge and skills through their interactions with trusted specialist colleagues, such as respirologists. The Doctors’ Lounge has traditionally provided the venue for many of these positive interactions. As family physicians would
ask case specific questions, their specialist colleagues provided them with the “just-in-time” information they needed to handle a patient problem appropriately or to institute the treatments, tests, etc. that facilitated care until the specialist was able to see the patient. The combination of formal and informal education ensured that family doctors and their specialist colleagues were together able to deliver high quality care for all patients in their communities.

In recent years, many people were unable to find a family physician. This has resulted in patients being reliant on emergency departments and walk-in clinics and, subsequently, on specialists and their specialty clinics for care that should be provided in the primary care sector. The end result has been long wait-times for patients who do need to be seen by a specialist. In addition, many family doctors became so busy in their practices that they gave up their privileges at their local hospital. The loss of the easy access to specialists in the doctors’ lounge means that patients are being referred to specialists to be assessed when a previously a simple conversation between the family doctor and specialist might have provided the support that the family doctor needed to care for the patient effectively. The end result of both of these situations is an overburdened specialty system, gridlock in accessing timely referrals and overwhelming workloads for family physicians.

To address this situation, the Ontario College of Family Physicians has established a number of Collaborative Care Networks. The Collaborative Care Networks pair specialists with family physicians with a special interest in a particular area of practice to mentor small groups of family doctors. The “just-in-time” guidance and advice from the mentors is paired with formal CPD/CME educational opportunities to raise the bar of care throughout the province. Networks have been established in collaboration with psychiatrists, geriatricians, neurologists, rheumatologists, endocrinologists, obstetricians and gynecologists. We are currently working on developing a program to link respirologists to family doctors to enhance the assessment, diagnosis and care of patients with respiratory conditions such as asthma and COPD. The Respiratory Collaborative Care Network is still in its infancy but we have high hopes for its success based on the innovations that have occurred within our other networks. When the expertise of family physicians is combined with that of respirologists, a win-win situation is created for patients, their physicians and the healthcare system in general. For more information in regards to the OCFP’s Collaborative care network, please contact Jan Kasperski at jk_ocfp@cfpc.ca.